

# **DEFENSE INFORMATION SYSTEMS AGENCY**

P. O. BOX 4502 ARLINGTON, VIRGINIA 22204-4502

IN REPLY Joint Interoperability Test Command (JITC)

13 Nov 08

#### MEMORANDUM FOR DISTRIBUTION

SUBJECT: Special Interoperability Test Certification of Dell 2330DN Printer Running

Software Version FPN.APS.F001abd-0 for Internet Protocol Version 6 Capability

References: (a) DoDD 4630.5, "Interoperability and Supportability of Information Technology

(IT) and National Security Systems (NSS)," 5 May 2004

(b) CJCSI 6212.01D, "Interoperability and Supportability of Information

Technology and National Security Systems," 8 March 2006

(c) through (h), see Enclosure 1

- 1. References (a) and (b) establish the Joint Interoperability Test Command (JITC), as the responsible organization for interoperability test certification.
- 2. The Dell 2330DN printer running software version (SV) FPN.APS.F001abd-0 met the Internet Protocol (IP) Version 6 (IPv6) Capable interoperability requirements of a Simple Server as described in the Department of Defense (DoD) Information Technology Standards Registry, "DoD IPv6 Standard Profiles for IPv6 Capable Products Version 2.0," 1 August 2007, reference (c). The Dell 2330DN printer running SV FPN.APS.F001abd-0 has successfully completed the related IPv6 Interoperability portions of the "DoD IPv6 Generic Test Plan (GTP) Version 3," August 2007, reference (d), and is certified for listing on the Unified Capabilities (UC) Approved Products List (APL) as IPv6 Capable. This certification expires upon changes that could affect interoperability, but no later than 3 years from the date of this memorandum.
- 3. This special certification is based on IPv6 Capable Interoperability testing conducted by JITC at Fort Huachuca, Arizona, and the vendor's Letter of Compliance (LoC) dated 1 May 2008. Interoperability testing commenced from 6 through 24 October 2008, at JITC's Advanced IP Technology Capability. Conformance testing was confirmed by Dell, and was verified in the LoC provided. Enclosure 2 documents the summary test results and describes the devices. Users should verify interoperability before deploying the devices in an environment that varies significantly from that described.
- 4. The device's interoperability status summary is in Table 1, and Table 2 contains the equipment listing.

JITC Memo, JTE, Special Interoperability Test Certification of Dell 2330DN Printer Running Software Version FPN.APS.F001abd-0 for Internet Protocol Version 6 Capability

**Table 1. Interoperability Status Summary** 

Fu	nctional Category	Requirement		Verified	
	Base IPv6	M		Yes	
	IPSec	S+		No	
Tr	ransition Mechanisms	S		No	
	Quality of Service	0		No	
Mobility		CS		No	
Bandwidth Limited Networks		0		No	
Server		0		Yes	
Host		S		No	
LEGEND	:				
CS	Conditional Should	S	Should		
IPSec	Internet Protocol Security	S+	Should Plus		
IPv6	Internet Protocol Version 6	O	Optional		
M	Must		•		
NOTE: T	he terms Must, Conditional Should	, Should, Should Plus, and Optional	are used to reference	ce specific required Request for	
Comments	s from the Internet Engineering Tas	k Force, the Department of Defense	Information Techno	ology Standards Registry, and the	
	nt of Defense Internet Protocol Vers			<i>e. e. i.</i>	

**Table 2. Equipment Listing** 

Dell 2330DN Printer						
Component	Firmware/Software	Interface				
Dell 2330DN	AL.LB.E047-0/FPN.APS.F001abd-0	RJ45 Gigabit Ethernet				
LEGEND: RJ Registered Jack						

5. No detailed test report was written in accordance with the Assistant Secretary of Defense-Networks Information and Integration. JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network (NIPRNet) e-mail. More comprehensive interoperability status information is available via the JITC System Tracking Program (STP). The STP is accessible by .mil/gov users on the NIPRNet at <a href="https://stp.fhu.disa.mil">https://stp.fhu.disa.mil</a>. Test reports, lessons learned, and related testing documents and references are on the JITC Joint Interoperability Tool (JIT) at <a href="http://jit.fhu.disa.mil">http://jit.fhu.disa.mil</a> (NIPRNet), or <a href="http://jitc.fhu.disa.mil/adv\_ip/register/register.html">http://jit.fhu.disa.mil</a> (NIPRNet) at <a href="http://jitc.fhu.disa.mil/adv\_ip/register/register.html">http://jitc.fhu.disa.mil/adv\_ip/register/register.html</a>.

JITC Memo, JTE, Special Interoperability Test Certification of Dell 2330DN Printer Running Software Version FPN.APS.F001abd-0 for Internet Protocol Version 6 Capability

6. The JITC point of contact is Donald L. Hann, DSN 879-5130, commercial (520) 538-5130, or e-mail: don.hann@disa.mil.

FOR THE COMMANDER:

2 Enclosures a/s

for RICHARD A. MEADOR

Chief

Battlespace Communications Portfolio

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U.S. Joint Forces Command, Net-Centric Integration, Communication, and Capabilities Division, J68

DITO, Defense Information Systems Agency (DISA), Attn: GE36, P.O. Box 4502, Arlington, VA 22204-4502

Dell Inc., Tim Cronin, Program Manager, One Dell Way, Round Rock, TX 78682

## ADDITIONAL REFERENCES

- (c) Department of Defense (DoD) Information Technology Standards Registry (DISR), "DoD Internet Protocol Version 6 (IPv6) Standard Profiles for IPv6 Capable Products Version 2.0," 1 August 2007
- (d) Joint Interoperability Test Command, "DoD IPv6 Generic Test Plan Version 3," August 2007
- (e) DoD Chief Information Officer (CIO) Memorandum, "IPv6," 9 June 2003
- (f) DoD CIO Memorandum, "IPv6 Interim Transition Guidance," 29 September 2003
- (g) DoD IPv6 Transition Office, "DoD IPv6 Master Test Plan, Version 2," September 2006
- (h) DoD, "DISR Global Information Grid (GIG) Convergence Master Plan (GCMP), Version 5.25," 29 March 2006

### INTERNET PROTOCOL VERSION 6 CAPABLE TESTING SUMMARY

- **1. SYSTEM TITLE.** The Dell 2330DN printer running software version (SV) FPN.APS.F001abd-0, hereafter referred to as the device under test (DUT).
- **2. PROPONENT.** Department of Defense (DoD) Internet Protocol (IP) Version 6 (IPv6) Transition Office (DITO).
- **3. PROGRAM MANAGER/USER POC.** DITO, Defense Information Systems Agency (DISA), Attn: GE36 Sam Assi, P.O. Box 4502, Arlington, VA 22204-4502, (703) 882-0241, e-mail: sam.assi@disa.mil.
- **4. TESTER.** Donald L. Hann, Joint Interoperability Test Command (JITC), P.O. Box 12798, Fort Huachuca, AZ 85670-2798, DSN: 879-5130, commercial: (520) 538-5130, e-mail: don.hann@disa.mil.
- **5. DEVICE UNDER TEST DESCRIPTION.** The DUT was the Dell 2330DN workgroup black and white laser printer.
- **6. OPERATIONAL ARCHITECTURE.** The operational architecture was the JITC simulated Defense Information Systems Network (DISN) IP Core Network as depicted in Figure 2-1.
- 7. REQUIRED DEVICE INTERFACES. All IPv6-capable products to be included on the Unified Capabilities Approved Product List must meet the requirements of the DoD Information Technology Standards Registry (DISR), "DoD IPv6 Standard Profiles for IPv6 Capable Products Version 2.0," 1 August 2007. Product testing conducted against these requirements is in accordance with the "DoD IPv6 Generic Test Plan (GTP) Version 3," August 2007. The IPv6 simple server profile requirements for conformance and interoperability are in Table 2-1.

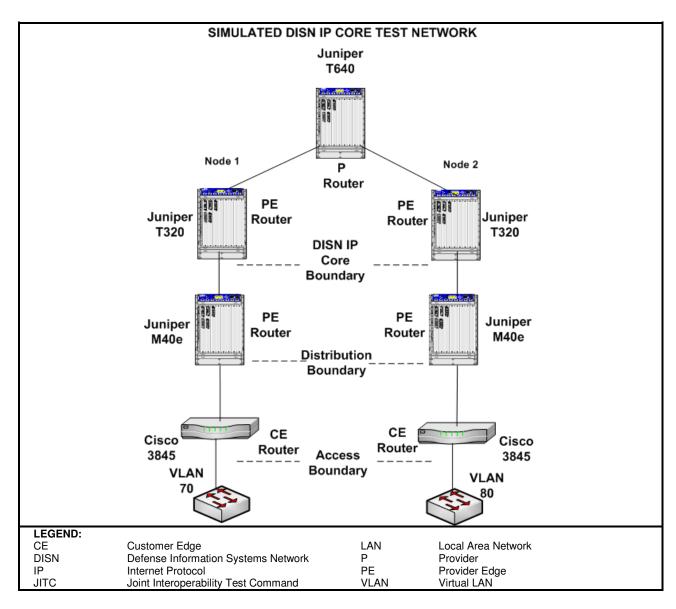


Figure 2-1. JITC Simulated DISN IP Core Network

Table 2-1. IPv6 Capability Requirements and Status

	Dell 2330DN Printer							
DEO	RFC Title	Testing Completed		Simple Server			0	
RFC		Conformance	Interoperability	Requirement		Implemented	Comments	
IPv6 Base								
2460	Internet Protocol version 6 (IPv6) Specification	Stated in LoC	Yes	М	Met	Yes		
4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	Stated in LoC	Yes	М	Met	Yes		
2461	Neighbor Discovery for IP version 6 (IPv6)	Stated in LoC	Yes	М	Met	Yes		
1981	Path Maximum Transmission Unit Discovery for IPv6	Stated in LoC	Yes	S	Met	Yes		
2462	IPv6 Stateless Address Auto configuration	Stated in LoC	Yes	М	Met	Yes	Note 1	
3315	DHCPv6 (Client)	Stated in LoC	Yes	М	Met	Yes	Note 1	
4291	IPv6 Addressing Architecture	Stated in LoC	Yes	М	Met	Yes		
4007	IPv6 Scoped Address Architecture	Stated in LoC	Yes	М	Met	Yes		
4193	Unique Local IPv6 Unicast Addresses	Stated in LoC	Yes	М	Met	Yes		
2710	Multicast Listener Discovery (MLD)	Stated in LoC	Yes	М	Met	Yes		
3810	Multicast Listener Discovery Version 2 (MLDv2) for IPv6	Not Stated	Not Tested	S	Not Tested	No		
2464	Transmission of IPv6 Packets over Ethernet Networks	Stated in LoC	Yes	CM	Met	Yes		
			IPSec					
4301	Security Architecture for the Internet Protocol	Not Stated	Not Tested	S+	Not Tested	No		
4302	IP Authentication Header	Not Stated	Not Tested	S	Not Tested	No		
4303	IP Encapsulating Security Payload (ESP)	Not Stated	Not Tested	S+	Not Tested	No		
4304	Extended Sequence Number (ESN) Addendum to IPsec Domain of Interpretation (DOI) for Internet Security Association and Key Management Protocol (ISAKMP)	Not Stated	Not Tested	s	Not Tested	No		
4305	Cryptographic Algorithm Implementation Requirements for Encapsulating Security Payload (ESP) and Authentication Header (AH)	Not Stated	Not Tested	S+	Not Tested	No		
4869	Suite B Cryptographic Suites for IPsec	Not Stated	Not Tested	S+	Not Tested	No		
4309	Using Advanced Encryption Standard (AES) CCM Mode with IPsec Encapsulating Security Payload (ESP)	Not Stated	Not Tested	CS	Not Tested	No		
3971	Secure Neighbor Discovery	Not Stated	Not Tested	S	Not Tested	No		

Table 2-1. IPv6 Capability Requirements and Status (continued)

			Dell 2330DN Printe	r			
RFC RFC Title Testing Completed				Simple Server		Impulamented	0
NFC	RFC LITTLE	Conformance	Interoperability	Requirement	Met/Not Met	Implemented	Comments
3972	Cryptographically Generated Addresses	Not Stated	Not Tested	S	Not Tested	No	
3041	Privacy Extensions for Stateless Address Auto configuration in IPv6	Not Stated	Not Tested	S	Not Tested	No	
4306	Internet Key Exchange Version 2 (IKEv2) Protocol	Not Stated	Not Tested	S+	Not Tested	No	
4307	Cryptographic Algorithms for Internet Key Exchange Version 2 (IKEv2)	Not Stated	Not Tested	S+	Not Tested	No	
		Tra	ansition Mechanis	ms			
4213	Transition Mechanisms for IPv6 Host and Routers	Not Stated	Not Tested	S	Not Tested	No	
2766	Network Address Translation – Protocol Translation (NAT-PT)	Not Stated	Not Tested	SN	Not Tested	No	
3053	IPv6 Tunnel Broker	Not Stated	Not Tested	CS	Not Tested	No	
			QoS				
2474	Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers	Not Stated	Not Tested	0	Not Tested	No	
2205	Resource ReSerVation Protocol (RSVP) – Version 1 Functional Specification	Not Stated	Not Tested	0	Not Tested	No	
2207	RSVP Extensions for IPSEC Data Flows	Not Stated	Not Tested	0	Not Tested	No	
2210	The Use of RSVP with IETF Integrated Services	Not Stated	Not Tested	0	Not Tested	No	
2750	RSVP Extensions for Policy Control	Not Stated	Not Tested	0	Not Tested	No	
3175	Aggregation of RSVP for IPv4 and IPv6 Reservations	Not Stated	Not Tested	0	Not Tested	No	
			Mobility				
3775 (sec 9)	Mobility Support in IPv6	Not Stated	Not Tested	CS	Not Tested	No	
		Band	width Limited Netv	works			
3095	Robust Header Compression (RoHC)	Not Stated	Not Tested	0	Not Tested	No	
3241	RoHC over PPP	Not Stated	Not Tested	0	Not Tested	No	
3843	RoHC: A Compression Profile for IP RoHC: A Link-Layer Assisted Profile for	Not Stated	Not Tested	0	Not Tested	No	
4362	IP/UDP/RTP	Not Stated	Not Tested	0	Not Tested	No	
2507	IP Header Compression	Not Stated	Not Tested	0	Not Tested	No	
2508	Compressing IP/UDP/RTP Headers for Low-Speed Serial Links	Not Stated	Not Tested	0	Not Tested	No	
			Server				
959	File Transfer Protocol	Not Stated	Not Tested	0	Not Tested	No	

Table 2-1. IPv6 Capability Requirements and Status (continued)

			Dell 2330DN Printe	er			
RFC	DEC Title	Testing Completed		Simple Server		land to an end and	0
KFC	RFC Title	Conformance	Interoperability	Requirement	Met/Not Met	Implemented	Comments
2428	FTP Extensions for IPv6 and NAT	Not Stated	Not Tested	0	Not Tested	No	
2911	Internet Printing Protocol	Not Stated	Not Tested	0	Not Tested	No	
3162	RADIUS (Remote Authentication Dial-In User Service) and IPv6	Not Stated	Not Tested	0	Not Tested	No	
3226	DNS Security and IPv6 A6 Aware Server/Resolver Message Size Requirements	Not Stated	Not Tested	0	Not Tested	No	
3261	Session Initiation Protocol (SIP)	Not Stated	Not Tested	0	Not Tested	No	
3596	DNS Extensions to Support IPv6	Not Stated	Not Tested	0	Not Tested	No	
			Host				
3484	Default Address Selection for IPv6	Not Stated	Not Tested	S	Not Tested	No	
3596	DNS Extensions to Support IPv6	Not Stated	Not Tested	S	Not Tested	No	
3986	Uniform Resource Identifier (URI): Generic Syntax	Not Stated	Not Tested	S	Not Tested	No	
LEGEND: CBC Cipher Block Chaining CCM CBC MAC Mode CM Conditional Must CS Conditional Should DHCPv6 Dynamic Host Configuration Protocol Version 6 DNS Domain Name Service DoD Department of Defense FTP File Transfer Protocol GTP General Test Plan IETF Internet Engineering Task Force IP Internet Protocol IPSec Internet Protocol Security IPv4 Internet Protocol Version 4 IPv6 Internet Protocol Version 6 ISAKMP Internet Security Association and Key Management Protocol NOTES:		LoC M MAC O PPP QoS RFC RoHC RSVP RTP S S+ SLAAC SN UDP	Optional Point-to-Po Quality of S Request for Robust Hea Resource F Real-Time Should Should Plus Stateless A Should Not	uthentication Code int Protocol int Protocol int Protocol comments ider Compression ReSerVation Protocol Transport Protocol is ddress Auto-configur			

<sup>1.</sup> All Product Classes MUST support a method of autonomous configuration, either SLAAC or DHCPv6 client.

<sup>2.</sup> The terms Conditional Must, Conditional Should, Must, Optional, Should Plus, and Should Not are used to reference specific required Request for Comments from the Internet Engineering Task Force, the Department of Defense Information Technology Standards Registry Department of Defense IPv6 Standard Profiles for IPv6 Capable Products Version 2.0, and the Department of Defense Internet Protocol Version 6 Generic Test Plan..

**8. TEST NETWORK DESCRIPTION.** The DUT was tested as part of the JITC simulated DISN IP Core Network managed by the Advanced IP Technology Capability, and configured as shown in Figure 2-2.

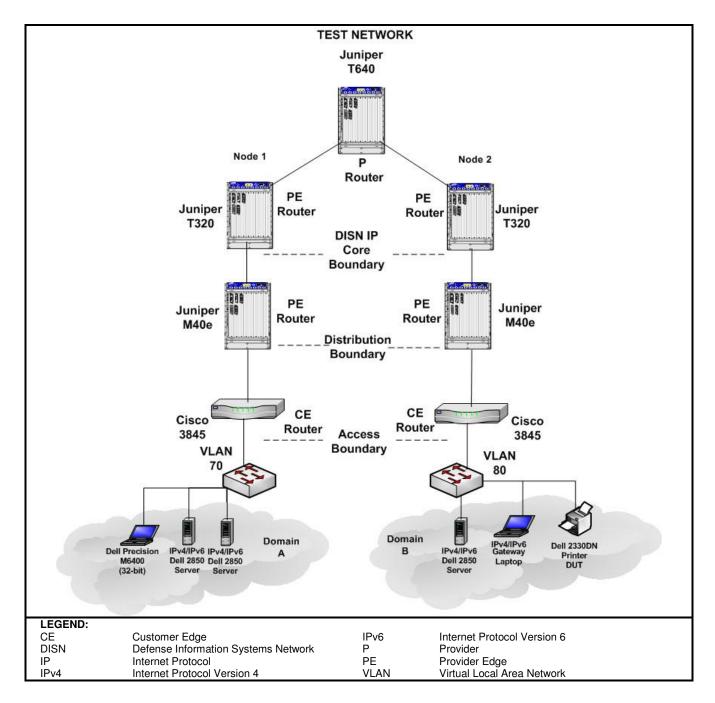


Figure 2-2. Test Network

**9. DEVICE CONFIGURATIONS.** Table 2-2 provides hardware and software components used in the test network.

**Table 2-2. Test Configuration Hardware and Software** 

Equipment Name		Model Number	IOS/OS/Version(s)				
Hardware							
Dell Printer - DUT		2330DN	AL.LB.E047-0/FPN.APS.F001abd-0				
	Dell Notebook	Precision M6400 (32-bit)	Microsoft Windows Vista SP 1				
	2 Cisco Routers	Cisco 3845	12.4(11)T				
	2 Juniper Routers	Juniper M40e	V 7.6R3.6				
	2 Juniper Routers	Juniper T320	V 7.5R4.4				
	Juniper Router	Juniper T640	V 7.5R4.4				
	Gateway Notebook	450ROG	Microsoft Windows XP Professional				
3 D	ell Power Edge Servers	2850	Microsoft Windows Server 2003 Enterprise SP2 Build 5.2.3790				
	Software						
Microso	ft Windows XP Professional	N/A	Build 5.1.2600 SP 2				
Mi	crosoft Windows Vista	N/A	Build 6.0.6000 SP 1				
Microsoft W	/indows Server 2003 Enterprise	N/A	Build 5.2.3790 SP 2				
	Xlight FTP Server	N/A	V 1.57				
	VLC Media Player	N/A	V 0.8.6b				
	Wireshark	N/A	V 1.0.2 (SVN Rev 25698)				
LEGEND: DUT FTP IOS LAN N/A OS R	Device Under Test Rev Revision File Transfer Protocol SP Service Pack		Service Pack Software Version Number New Technology Version				

### 10. TEST LIMITATIONS. None.

# 11. TEST RESULTS.

#### a. IPv6 Base.

<u>Test Case C.1.1.</u> The Request for Comments (RFC) 1981 Path Maximum Transmission Unit Discovery for IPv6 is necessary for proper IPv6 implementations. It acts as a mechanism to determine the maximum size of packets to traverse the network without fragmentation. The Dell 2330DN printer running software version (SV) FPN.APS.F001abd-0 met the test requirement.

<u>Test Case C.1.2.</u> The RFC 2460 IPv6 Specification is the base specification of the IPv6 protocol. It specifies a number of parameters that enable successful completion of IPv6 traffic addressing and control. The Dell 2330DN printer running SV FPN.APS.F001abd-0 met the test requirement.

- <u>Test Case C.1.14.</u> The RFC 4443 Internet Control Message Protocol (ICMP) for the IPv6 specification identifies ICMP messages for the IPv6 protocol. It includes message format and identifies two types of messages: error and informational. The Dell 2330DN printer running SV FPN.APS.F001abd-0 met the test requirement.
- <u>Test Case C.1.3.</u> The RFC 2461 Neighbor Discovery for IPv6 specifies the neighbor discovery function that is similar to address resolution protocol in IP Version 4. It is necessary for implementing neighbor solicitations and neighbor advertisements within IPv6. The Dell 2330DN printer running SV FPN.APS.F001abd-0 met the test requirement.
- <u>Test Case C.1.4.</u> The RFC 2462 IPv6 Stateless Address Auto-configuration specifies how a host auto-configures its interfaces in IPv6. These steps include determining whether the source addressing should be stateless or stateful, whether the information obtained should be solely the address or include other information, and whether Duplicate Address Detection identifies duplicate addresses on the network, and then issues a new address accordingly. The Dell 2330DN printer running SV FPN.APS.F001abd-0 met the test requirement.
- <u>Test Case C.3.8.</u> The RFC 3315 Dynamic Host Configuration Protocol (DHCP) for IPv6 specifies the use of an enabled DHCP server passing configuration parameters such as IPv6 network addresses to IPv6 nodes. The Dell 2330DN printer running SV FPN.APS.F001abd-0 met the test requirement.
- <u>Test Case C.1.13.</u> The RFC 4291 IPv6 Addressing Architecture defines the specifications for the addressing architecture of the IPv6 protocol. The definitions cover unicast addresses, anycast addresses, and multicast addresses. The Dell 2330DN printer running SV FPN.APS.F001abd-0 met the test requirement.
- <u>Test Case C.1.11.</u> The RFC 4007 IPv6 Scoped Address Architecture defines the nature and characteristics for the usage of IPv6 addresses of different scopes. The Dell 2330DN printer running SV FPN.APS.F001abd-0 met the test requirement.
- <u>Test Case C.1.12.</u> The RFC 4193 Unique Local IPv6 Unicast Addresses defines globally unique local addresses. Local IPv6 unicast addressing is intended to be used for local communications and is not expected to be routed to the Internet. The Dell 2330DN printer running SV FPN.APS.F001abd-0 met the test requirement.
- Test Case C.1.8. The RFC 2710 Multicast Listener Discovery for IPv6 specifies the protocol used by an IPv6 router to discover the presence of multicast listeners (i.e., nodes wishing to receive multicast packets) on its directly attached links, and to discover specifically which multicast addresses are of interest to those neighboring nodes. The Dell 2330DN printer running SV FPN.APS.F001abd-0 met the test requirement.

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- <u>Test Case C.1.5.</u> The RFC 2464 Transmission of IPv6 Packets over Ethernet Networks specifies the frame format for transmission of IPv6 link-local addresses and statelessly auto-configured addresses on Ethernet networks. The Dell 2330DN printer running SV FPN.APS.F001abd-0 met the test requirement.
- **c. Conclusion.** The Dell 2330DN printer running SV FPN.APS.F001abd-0 met all the required RFCs.
- 12. TEST AND ANALYSIS REPORT. No detailed test report was written in accordance with the Assistant Secretary of Defense-Networks Information and Integration. All test data is maintained in the Advanced IP Technology Capability and is available upon request. This certification is available on the Joint Interoperability Tool (JIT). The JIT homepage is <a href="http://jit.fhu.disa.mil">http://jit.fhu.disa.mil</a> (NIPRNet), or <a href="http://199.208.204.125/">http://jit.fhu.disa.mil</a> (NIPRNet), or <a href="http://199.208.204.125/">http://199.208.204.125/</a> (SIPRNet). The JIT has links to JITC interoperability documents to provide the DoD community, including the warfighter in the field, easy access to the latest interoperability information. System interoperability status information is available via the JITC System Tracking Program (STP). The STP is accessible by .mil/.gov users on the NIPRNet at: <a href="https://stp.fhu.disa.mil/">https://stp.fhu.disa.mil/</a>.